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A Systematic Literature Review Examining the Gender Gap in Collegiate Aviation and Aerospace Education

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Using a systematic literature review research methodology, researchers identified 22 scholarly journal articles published between January 2004 to May 2020, from five engineering, science, technology, and education databases. The objective of this study is to systematically explore the gender gap in collegiate aviation and aerospace education and highlight some of the factors that may be contributing to the gender gap in aviation and aerospace college programs. In addition, the researchers provide an in-depth analysis showing the research areas covered in the existing literature on the topic of gender imbalance and perceptions of female students in collegiate aviation education. Two research questions were developed, and a search strategy was developed. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used to search, screen, and set inclusion and exclusion criteria for the scholarly journal articles. The 22 scholarly journals were analyzed thematically. Results show that lack of organized mentorship and challenges in recruitment and retention of female students are among the areas that need more attention to bridge the gender gap in collegiate aviation programs. Other themes include persisting gender stereotypes and masculine culture in traditionally male-dominated fields. Based on the findings of this study, the researchers recommend a follow-up study focusing on the analysis of the trends in the number of women enrolled in collegiate aviation and aerospace programs.

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Before the global COVID-19 pandemic that hit the world in early 2020, the aviation industry was one of the fastest-growing industries, with an estimated annual growth of 4.6 percent (Boeing, 2019). While the aviation industry has experienced steady growth over the last decades, women and minority groups are underrepresented in most aviation and aerospace professions. Ludtke (1994) reported that approximately six percent of all United States (U.S.) registered commercial pilots were women. Nearly three decades later, the number of female commercial pilots remains significantly slow. Data from the Federal Aviation Administration (FAA) airmen statistics, 2009 to 2018, showed that about 6.5 percent of all registered commercial pilots in the United States were female (FAA, 2019). In addition, other studies spanning decades have shown that women are underrepresented in undergraduate aviation and aerospace degree programs (Ison, 2009; Ludtke & Bowen, 1993; Sobieralski & Hubbard, 2019).

Furthermore, women are underrepresented in many STEM fields (Kanny et al., 2014; Saunders et al., 2020), under which aviation and aerospace degrees are classified. According to the National Center for Education Statistics [NCES] (2019), the percentage of women graduating with a bachelor's degree in any field is higher than that of men (58% to 42%). However, fewer women are graduating with a bachelor's degree in STEM (64% to 36%). Saunders et al. (2020) cited "implicit and explicit bias, sexual harassment, unequal access to funding and resources, pay inequity and higher teaching and advising load" (p. 2) among the factors that discourage women from pursuing careers in science, engineering, and medicine. Other studies showed that lack of role models and mentors, gender stereotyping, and less family flexibility in STEM careers contribute to low interest in STEM careers by women (Beede et al., 2011; Ludtke, 1994). Mentorship and role models play an important part in attracting youth to aviation and aerospace careers (Bishop et al., 2002; KORNFERRY, 2019; Opengart & Ison, 2016). With fewer women in aviation faculty positions, women in collegiate aviation and aerospace degree programs often lack mentorship, a key factor in increasing retention of women in traditionally male-dominated fields (Anderson & Pucel, 2003). There have been efforts to increase mentorship for youth who show interest in aviation aerospace careers at an early age. Organizations such as the *Ninety Nines* and Women in Aviation International (WAI) provide a platform for young girls to connect with professional women in aviation and aerospace careers through networking and mentorship. Nevertheless, a lot more proactive actions are needed to increase the participation of women in aviation and aerospace careers.

The entire aviation and aerospace industry stands to benefit from gender diversity and other forms of diversity. Studies of gender diversity in the workforce show that organizations with higher gender diversity reported positive market valuation and increased revenue (Fischer & Mullin, 2014; Zhang, 2020). Furthermore, the importance of gender diversity in the aviation and aerospace industry has been highlighted by various governments and international organization initiatives. In 2020 the FAA formed the Women in Aviation Advisory Board to provide recommendations "to explore opportunities for encouraging and supporting female students and aviators to pursue a career in aviation…" (FAA, 2020. Par 1). The International Civil Aviation

Organization (ICAO) in collaboration with the South African Civil Aviation Authority (SACAA) held the first ever Global Aviation Gender Summit in Cape Town, South Africa in 2018 "to mobilize the global aviation community to accelerate gender equality in aviation" (ICAO, 2018, par 4). The International Aviation Women Association (IAWA) in collaboration with industry stakeholders published the *Soaring Through the Glass Ceiling* report, a "comprehensive study focused on enhancing the attraction, retention, and advancement of women across all facets of the industry*"* (KORNFERRY, 2019, p.1).

Notably, although several studies have explored the underrepresentation of women in aviation and aerospace careers, few studies have focused on the gender gap in collegiate aviation and aerospace education. This study aims to bridge the gap by systematically exploring existing literature on the underrepresentation of women in aviation and aerospace degree programs and highlighting some of the factors that may be contributing to the gender gap in aviation and aerospace collegiate programs.

Study Objective and Research Questions

Women are underrepresented in aviation and aerospace collegiate education. The objective of this systematic literature review is to use a systematic literature review methodology to explore the gender gap in collegiate aviation and aerospace education. In addition, the study aims to highlight some of the factors that may be contributing to the gender gap in aviation and aerospace college programs. The researchers will provide an in-depth analysis showing the research areas covered in the existing literature on the topic of gender imbalance and the perception of female students in collegiate aviation education. The study will answer two research questions:

RQ1. Which aspects of gender imbalance and perceptions of female students in college aviation and aerospace programs are addressed in current literature?

RQ2. What factors have contributed to the current gender gap in aviation and aerospace collegiate education?

Methodology

This study uses a systematic literature review research methodology to examine the current gender gap in collegiate aviation and aerospace education. A systematic review is a review of literature that follows a set of scientific methods that clearly aim to limit systematic error (bias) by attempting to identify, appraise and synthesize all relevant studies (of whatever design) to answer a particular question (Bettany-Saltikov, 2010; Petticrew & Roberts, 2006).

Systematic literature reviews are commonly conducted in the fields of medicine, psychology, and education to critically appraise, summarize, and attempt to "reconcile the evidence in order to inform policy and practice" (Petticrew & Roberts, 2006, p. 15). These types of studies can be applied to other emerging fields of study to provide synthesized reviews on the ever-mounting scholarly work produced every year (Borrego, Foster & Froyd, 2014). Based on

the literature review conducted for this study, no existing systematic literature reviews were found on the topic of gender imbalance in collegiate aviation and aerospace education.

Advantages of Conducting a Systematic Literature Review

1. Any individual research study may be fallible, either by chance or because of how it was designed and conducted or reported,
2. Any individual study may have limited relevance because of its scope and context,
3. A review provides a more comprehensive and stronger picture based on many studies and settings rather than a single study,
4. The task of keeping abreast of all previous and new research is usually too large for an individual,
5. Findings from a review provide a context for interpreting the results of a new primary study,
6. Undertaking new primary studies without being informed about previous research may result in unnecessary, inappropriate, irrelevant, or unethical research (Gough, Oliver & Thomas, 2017, p. 3).

Search Strategy

Five databases with publications in the fields of engineering and technology education, aviation and aerospace education, and STEM were selected for this study. Namely, ERIC, Compendex, Scopus, ProQuest Technology Collection, and Academic Premiers. Search strategies were applied to each database to identify candidate scholarly articles for the systematic analysis. A combination of the keywords was identified and entered in each of the five databases. Boolean terms 'AND' and 'OR' were applied. Table 1 shows the summary of the search strategy used in each of the five databases. Filters: 'Language = English,' 'Year of publication = Jan 2004 – May 2020', "Publication type = peer-reviewed or scholarly article', were used to narrow down results in each database. Keywords entered in the databases search were Aviation, aerospace, education, postsecondary, undergraduate, college and university.

Inclusion and Exclusion Criteria

Inclusion and exclusion criteria are the processes of identifying the types of study to be included or excluded from the analysis (Petticrew & Roberts, 2006). Table 2 shows the inclusion and exclusion criteria used.

Table 1
Summary of the search strategy

Database	Search Strategy
Compendex	Search Field 1 Search constructed using the "Quick Search" option: Search Field 1: (gender or female or wom*n); selected "Subject/Title/Abstract" AND Search Field 2: (aviation or aerospace); selected "Subject/Title/Abstract" AND Search Field 3: (college or university or undergraduate OR postsecondary); selected "Subject/Title/Abstract"
Scopus	Search constructed using the "Advanced option: Search Field 1: (gender or female or wom*n); selected "Article title, Abstract, Keywords" AND Search Field 2: (aviation or aerospace); selected "Article title, Abstract, Keywords" AND Search Field 3: (college or university or undergraduate OR postsecondary); selected "Article title, Abstract, Keywords"
ProQuest Technology Collection	Search constructed using the "Advanced option: Search Field 1: (gender or female or wom*n); selected "Abstract" AND Search Field 2: (aviation or aerospace); selected "Abstract" AND Search Field 3: (college or university or undergraduate OR postsecondary); selected "Abstract"
Academic Search Premier [EBSCO]	"Advanced Search": Field 1: AB: gender or wom*n, or female AND Field 2: AB: aviation or aerospace AND Field 3: AB: college or university or undergraduate OR postsecondary

Table 2
Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion criteria
▪ Peer reviewed scholarly journals articles. ▪ Publication years January 2004 – May 2020. ▪ Publications in English. ▪ The article focused aviation or aerospace education at college level. ▪ The article included undergraduate aviation and aerospace students in the sample. ▪ The article addressed gender related issues in aviation and aerospace education.	▪ Article focused on gender gap in the workforce. ▪ Article addressed specialized topics in aviation and aerospace such as aviation medicine and human factors. ▪ Article addressed a non-education related topic. ▪ The article did not address gender related issues in aviation and aerospace education.

Results and Discussion

This section discusses the findings of the study. Three steps were followed in reporting the findings (Petticrew & Roberts, 2006).

Step 1. Mapping - organize the studies, e.g., by outcome, population, level of analysis, and study design. Mapping maps the work that has been done in a field or topic areas. Mapping also helps to inform the decision on where to focus the rest of the analysis. Table 3 was prepared to map the key aspects of the studies used for the systematic analysis. The researchers noted the author(s) and year of publication, title of article, methodology or study design and themes that were apparent in each article. Additional notes were made to supplement the themes identified.

Step 2. Critique within studies using tables. The second step focuses on presenting the assessment of quality for each study in turn. The level of detail can range from the amount of text that fits in a table to lengthy summaries.

Step 3. Critique across studies. This step is the heart of synthesis and the major contribution of systematic reviews. The thematic analysis section provides a critique across the twenty-two scholarly articles used in the systematic review.

Table 3 shows a list with the twenty-two peer reviewed articles included in the final systematic analysis.

Search and Selection Process

A detailed and systematic record search and selection criteria give a systematic review transparency and can be helpful to future researchers wishing to replicate the study (Petticrew & Roberts, 2006). In practice, the search and selection process is a nonlinear process and might involve a back and forth search that must all be reordered for transparency. The inclusion and exclusion criteria shown in table 2 were applied. In addition, Figure 1 shows a Preferred Reporting Items for Systematic Reviews and Meta-Analyses **(**PRISMA) diagram created for this study based on Moher, Liberati, Altman and The PRISMA group (2009).

Figure 1
PRISMA diagram showing the search, screening, & search criteria. Adapted from Moher et al. (2009).

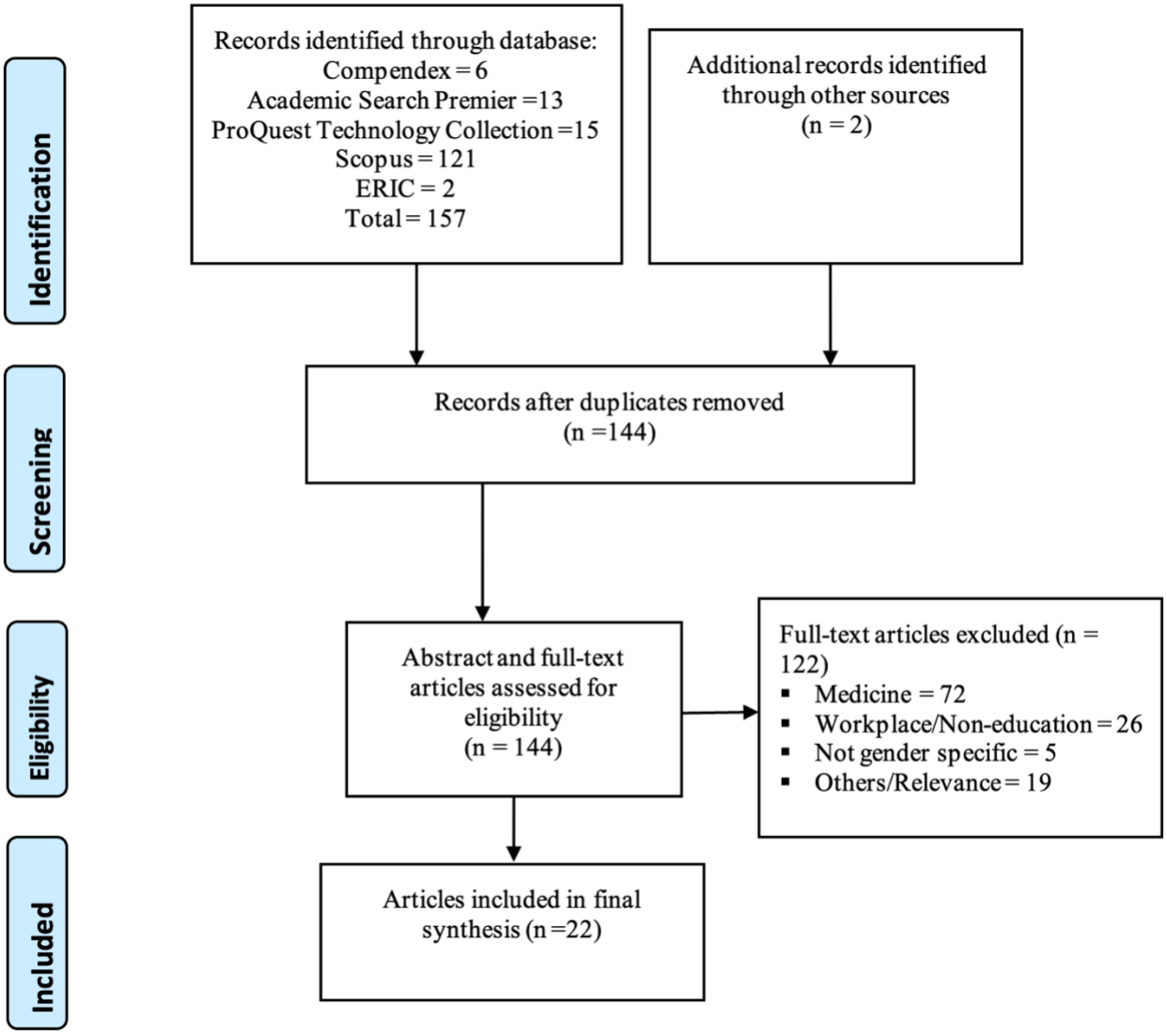

Table 3
List of 22 Scholarly Articles Included in the Final Systematic Analysis

Author (Year)	Title	Methodology	Theme (s)	Additional Notes
Acikel, Turhan and Akbulut (2018)	Effect of multitasking on simulator sickness and performance in 3D aerodrome control training.	Time-series design, quasi-experiment, simulator training, ANOVA.	Characteristics of flight students	This study was not directly related to the issues of gender in collegiate aviation. It shows characteristics of Air Traffic Control (ATC) in training.
Carretta, King, Ree, Teachout and Barto (2016)	Compilation of cognitive and personality norms for military aviators	Multidimensional Aptitude Battery (MAB-II) test and NEO Personality Inventory- Revised (NEO PI-R)	Personality differences, cognitive abilities	Sample include pilot trainees: Military pilot trainees, ROTC, and USAF cadets. Does not address gender differences in aviation education
Clark (2006)	The face of collegiate aviation: Factors impacting self selection of collegiate aviation programs	Survey Chi-square analysis	Passion for aviation, WAI presence; mentorship, scholarships, similar gender faculty.	
Davey (2004)	The impact of human factors on Ab Initio pilot training	Discourse association, Foucauldian analysis, Interviews	Attitudes towards female pilot trainees, use of gendered language, military aviation, masculine culture, risk averseness, gender stereotypes, lack of role models.	This article focused on application of human factors in pilot training and how different aviation professionals, including pilots in training view human factors.
Depperschmidt and Bliss (2009)	Female flight students: Perceptions of barriers and gender biases within collegiate flight programs	Structured questionnaire. Descriptive statistics	Mentorship, parental/family guidance, college recruitment, female staff in the program(mentorship), cost of training, recruitment and retention of female students, education and outreach program, funding, masculine culture, lack confidence in their abilities, strain from course load.	

Table 3. continued. List of 22 Scholarly Articles Included in the Final Systematic Analysis

Author (Year)	Title	Methodology	Theme (s)	Additional Notes
Dittmer (2009)	Evaluating Multimedia Exposure on Pass Rates of Private Pilots	Questionnaire. Post-test only control. t-test; Chi-square test, One-way ANOVA: Scheffe multiple comparison test.	None applicable	This study does not relate directly to gender/female students. The sample used consists of female students.
Ferrel, Carney, and Winter (2011)	Risk perception analysis of a small aircraft transportation system	Survey (Questionnaire) Chi-Square analysis.	None applicable	Sample consists of university faculty only
Furedy (2019)	Gender differences and their relation to hazardous attitudes in pilot training	Standard questionnaire - New Hazardous Attitude Survey (N-HAS) Statistical analysis using SPSS T test Paired t-test ANOVA MANOVA.	Decision-making habits, females tend to adjust to fit gender norms, gender role expectations, pilots' behavior.	Study focused on flight training and decision making between female and male students.
Germain, Herzog, and Hamilton (2012)	Women employed in male dominated industries: lesson learned from female aircraft pilots, pilots in training and mixed gender flight instructors.	Survey. Content analysis	Mentorship, traditional gender roles.	Sample consisted of small part of women flight students
Halleran (2019)	Gender Balance in Aviation.	Conference Proceeding – Paper in review.	College recruitment, outreach programs, mentorship, summer camps and workshops, STEM advocacy.	
Ison (2009)	Have we made progress: Trends in minority participation?	Industry statistics	Mentorship, recruitment, collaboration with industry.	

Table 3. continued. List of 22 Scholarly Articles Included in the Final Systematic Analysis

Author (Year)	Title	Methodology	Theme(s)	Additional Notes
Ison (2010)	The future of women in aviation postsecondary education.	Industry statistics	Mentorship	
Ison, Herron and Weiland (2016)	Two decades of progress for minorities in aviation	Historical data analysis, Chi-square test Z test.	Diversity in STEM programs.	Graduation rate. This study focused on women graduating from aviation colleges as a subgroup of minority groups
Lancia (2017)	"We can and will do it" Female perceptions of pilot as a career	Qualitative study; Interviews	Awareness of aviation, suitability of aviation careers and gender discrimination.	
Lu, Gao, Wang, Bai, Wang, and Wu (2018)	80 Years education of aerospace science and technology in Tsinghua University.	Historical data analysis	None applicable	
Lutte (2018)	Aviation outreach model and gap analysis: Examining solutions to address workforce shortages	Aviation outreach model. Gap analysis	Recruiting youth, outreach programs, mentorship and role models, affiliate organizations.	
Main, Johnson, Ramirez, Ebrahiminejad, Ohland and Groll (2020)	A case for disaggregating engineering education research: The relationship between Co-Op participation and student academic outcomes.	Logit Regression Analysis	Participation in training programs e.g., Co-Op	Study focused of all engineering programs. Sample consists of aerospace engineering female students.
Mattson, Johnson, Olson, and Ferguson (2007)	Gender and multicultural curriculum issues for undergraduate aviation students	Survey questionnaire.	Promoting diversity.	
Scharf and Cross (2019)	Analysis of low time pilot attitudes in University Aviation Association member flight schools.	Standard questionnaire; Survey, factorial analysis.	Self-confidence, pilots' behavior	This study is not directly related to flight education and gender imbalance

Table 3. continued. List of 22 Scholarly Articles Included in the Final Systematic Analysis

Author (Year)	Title	Methodology	Theme(s)	Additional Notes
Sutton, Buset and Keller (2014)	Navigation experience and mental representations of the environment: Do pilots build better cognitive maps?	Simulator training / Virtual Reality.	None applicable	Sample includes female students in flight schools.
Walton and Politano (2016)	Characteristics of general aviation accidents involving male and female pilots	Archival accident data/document analysis. Test of significance (Z test)	Pilots' behavior - Risk averseness and attitudes	This study addressed pilots' behavior such as tendency to take risks. Not directly related to flight education

RQ1. Which aspects of gender imbalance and perceptions of female students in college aviation and aerospace programs are addressed in current literature?

The findings of this study show that there is a dearth of literature that focuses on gender imbalance in collegiate education. In some instances, gender imbalance in collegiate education is included as a sub-section of a larger study (e.g., Dittmer, 2009; Sutton et al., 2014; Ison et al., 2016). Specialized fields of aviation and aerospace education are the least studied. For instance, Main et al. (2020) was the only study that mentions female students in aerospace engineering degree programs, and Açıkel et al. (2018) was the only study that included a sample of female students majoring in Air Traffic Control (ATC) studies.

Mentorship, diversity, college recruitment, and retention appeared most frequently in the existing literature. Mentorship is mentioned in six of twenty-two scholarly papers analyzed. In all instances, mentorship is highlighted as a potential solution to increase enrollment of women in aviation degree programs. Lack of diversity is highlighted as one of the areas of improvement for aviation programs. College recruitment and retention is a suggested solution for increasing the participation of women and other minority groups.

The perception of participation of women in aviation careers does not differ between women and men. Specifically, women enrolled in college aviation programs perceived a career in aviation the same way as their male counterparts. For example, Clark (2006) found that women in-flight programs are as passionate about flying as their male counterparts. Deppershmidt and Bliss (2009) found that women do not leave aviation programs because they are incapable of completing the course requirements. Davey (2004) reported that female cadets were perceived as more likely to succeed if they demonstrated 'type A' personality that is associated with men.

RQ2. What factors have contributed to the current gender gap in aviation and aerospace education?

Research Question 2 sought to identify factors addressed in the twenty-two scholarly articles that may have contributed to the current gender imbalance in aviation and aerospace education.

Theme 1. Lack of mentorship, role models, and networking opportunities

The current gender imbalance in aviation and aerospace education may be attributed to a lack of mentorship and role models in aviation and aerospace professions. Six of 22 articles emphasized identifying a role model and mentorship as challenges for female students. According to Clark (2006), women reported that the presence of WAI on campus is one of the factors that attract female applicants to colleges. WAI provides an opportunity for youth to connect and receive mentorship from experienced female professionals. Several studies (Davey, 2004; Deppperschmidt & Bliss, 2009; Germain et al., 2012; Halleran, 2009; Lancia, 2017) referenced mentorship, role models and networking opportunities as key to attracting young girls to aviation and aerospace careers. Deppperschmidt and Bliss' (2009) study of 262 female flight students from 18 four-year and 12 two-year colleges reported that 50% of the students had no female aviator role models before choosing to pursue flight training. In the same study, less than

five percent of the respondents had female flight instructors or flight administrators holding a senior flight management position (e.g., director, manager, or chief flight instructor) in their flight programs. Lancia (2017) reported that flight students in Canada lacked adequate knowledge of professions in the industry, while experienced female professionals described their career paths as lonely. DeLisi et al. (2011) emphasized the importance of collaboration with professionals and peer/near-peer mentorship relationships, which could potentially bridge the gap between industry and schools/educators.

Theme 2. Recruitment, retention, and outreach programs

Four of the 22 articles address recruitment and retention as contributing factors for gender imbalance in aviation programs. In a summative study of the 30 collegiate aviation programs, Depperschmidt and Bliss (2009) reported that 98% of the respondents indicated that their flight programs consisted of less than 25% female students, and 70% had less than 10 percent female students. In addition to the inadequate recruitment practices, little follow up is done to ensure the few enrolled female students are retained in the programs. According to Lancia (2017), besides creating awareness on aviation and aerospace career paths for youth, additional measures need to be taken to retain women in aviation programs. In the study conducted in Canada (Lancia, 2017), several female flight students expressed concerns that no one had ever asked about the challenges they faced as female pilots in training. Collaborative working and mentorship were identified as great opportunities for attracting girls into aviation and aerospace education (DeLisi, 2011), for example, a collaboration between high school students, college students, and industry professionals.

Theme 3. Lack of diversity in STEM education

Despite more women being enrolled in colleges and universities, enrollment of women in STEM degrees is lower than that of men. A study of 20 years of data on the participation of minorities (including women) in the aviation industry (Ison, 2010) reported that total minority enrollment in colleges increased to 22.2% in 2014 from 16.5% in 1997. Notably, while there was an increase in the general minority groups, the numbers for women were reported to be decreasing. In addition, the number of women enrolled in four-year professional flight programs was the lowest among all aviation professions in aviation higher education. Halleran (2019) proposed that "universities and colleges should establish outreach programs that promote female STEM awareness as well as establish industry relationships to create collegial partnerships that lead to recruiting female students" (para. 1). Increasing awareness of STEM careers was the focus of one study (DeLisi et al., 2011). According to DeLisi et al. (2011), early exposure to STEM education can help women to persist through a career in STEM education.

Theme 4. Gender stereotypes and traditional women's role

The study of power effect on human factors in a cadet training program (Davey, 2004) found that the few women who made it to the program were often described as 'good communicators', 'obedient', 'responsible', and 'less likely to take the risk'. Lancia (2017) identified the suitability of aviation as a career as a concern for female students in Canada. According to Germain et al. (2012), most women do not enroll in flight training with the goal of

becoming professional commercial pilots, instead, women are more interested in flight to fulfill a childhood dream or because they think it is a fun experience. This finding contrasts with the findings by Clark (2006) who posited that students in four-year aviation programs enroll with the goal of training to be commercial airline pilots, regardless of gender.

Theme 5. Masculine culture in the aviation and aerospace professions

Women who choose careers in male dominated industries are associated with masculinity or "type A" personality (Davey, 2014; Lancia, 2017). According to Davey (2014), women who choose careers as pilots are expected to display masculine qualities to 'fit in'. "Female ab initio pilots are perceived as competent because they have to survive in a male dominated environment" (Davey, 2004, p. 640). In the study by Germain et al. (2012), female students said they felt that plane seats in training aircraft were uncomfortable. Nonetheless, while more women have joined the flight profession, aircraft designs have not changed to accommodate the female physique. This gender bias is also expressed by 53% of the students in the study by Depperschmidt and Bliss (2009). According to Depperschmidt and Bliss (2009), many students believed there exists a gender bias in their collegiate flight programs whether knowingly or unknowingly. As one student states in the Depperschmidt and Bliss (2009) study, gender gaps may exist not because of the gender bias but because it has been the norm for the industry.

Discussion

The objective of this study was to systematically identify scholarly literature on gender imbalance in collegiate aviation and aerospace education, identify aspects of gender imbalance and perceptions of female students addressed in current literature, and identify factors that may be contributing to gender imbalance in collegiate aviation and aerospace education. The findings of this study show that there are few studies that have focused on gender imbalance in collegiate aviation and aerospace education for the period between January 2004 to May 2020. Furthermore, in the last three decades, representation of women in aviation and aerospace education has remined low. The small numbers of women in aviation and aerospace education may be attributed to challenges that have persisted in the aviation and aerospace industry for decades. For instance, gender stereotypes and the misconception that aviation and aerospace careers are for men only. Although women have demonstrated passion and capability as competent aviation and aerospace professionals, the profession remains male dominated. The paucity of studies that focus on gender imbalance in collegiate aviation and aerospace education are consistent with the findings of Ison et al. (2016).

The findings of this study show that gender stereotypes and persistent masculine culture are among the factors that may be contributing to gender imbalance in aviation and aerospace education. Whereas female students perceive themselves as capable of pursuing careers in aviation and aerospace professions, other parties may not perceive them in the same way (Carretta et., 2016; Davey, 2004). Women are expected to behave a certain way to be considered competent aviation and aerospace professionals. Surprisingly, qualities such as 'good communicator' and 'listener' that are associated with a good pilot are only used to describe female pilots but not their male counterparts (Davey,2004). The viewpoint that some career paths are for females and others for males is outdated. To bridge the current gender gap in aviation and aerospace collegiate education, all stakeholders should take measures to eliminate gender

stereotyping and promote a positive culture where female students feel welcome to pursue careers they are passionate about.

As indicated by themes one to three, measures are needed to increase mentorship, increase recruitment and retention, and promote STEM careers for women in male-dominated career paths. While there are initiatives directed towards increasing the participation of females in aviation and aerospace careers, more proactive measures are needed to close the current gender gap in collegiate aviation and aerospace education. For example, collaborations between schools and industry may bridge the gap on mentorship as more youths will have opportunities to interact with successful female professionals. Furthermore, colleges and universities should actively aim to recruit female students to their programs. In addition, companies, colleges, universities, and all pertinent parties should actively try to eliminate the masculine culture that is so persistent today.

Given the recent policy developments including the establishment of the Women in Aviation Advisory Board by the FAA (FAA, 2020), this study is timely. To bridge the current gender gap in aviation and aerospace collegiate education, it is crucial to understand how women are perceived in aviation and aerospace careers, and factor that may be contributing to the persistent gender gap in the field. The findings of this study may be used by colleges and universities recruiters and policymakers to promote gender balance in collegiate aviation and aerospace education.

Limitations

The limitations of this study include, firstly, the number of females included in most scholarly articles in the systematic literature review was significantly small. Therefore, the studies may not be reflective of the true picture of all females in all aviation and aerospace programs. Secondly, the scholarly articles considered for this systematic review were published between January 2004 to May 2020. Studies have been published since May 2020 that may show new findings.

Conclusion and Recommendations for Future Studies

This systematic literature review examines the current gender gap in aviation and aerospace collegiate education. Twenty-two peer reviewed journal articles were systematically identified from five databases and analyzed. The findings of the study suggest that women perceive themselves as competent and capable of pursuing careers in aviation and aerospace field however, other parties may perceive women differently. The authors identified five major factors that may be contributing to the current gender gap in collegiate aviation and aerospace education. The findings of this study may be useful to college and university recruiters and policy makers looking to increase enrollment of women in aviation and aerospace college programs. Researchers of this study recommend that future research should focus on gender imbalance in aviation and aerospace education as the primary topic. For instance, an analysis of the trends in enrollment of women in aviation and aerospace programs. Future studies may also focus on women in specific aviation and aerospace specializations such as aerospace engineering or aerospace engineering technology.

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